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From waste to wells: An idea for Hampton Roads' water woes

Hampton Roads Sanitation District general manager Ted Henifin discusses a pilot project that treats wastewater to a purified state.

HRSD offers a potential answer to #HRVA's shrinking groundwater aquifer

SEAFORD — With a sip of specially treated wastewater, Hampton Roads Sanitation District general manager Ted Henifin put his mouth where his money is — what could be a \$1 billion effort to replenish eastern Virginia's rapidly shrinking pool of groundwater.

A pilot program at the agency's York River Treatment Plant shows it is possible to clean the water Hampton Roads residents flush out of their homes and businesses so that it is safe to drink, he told a gathering of state and local officials.

Not that he expects anyone will be drinking it any time soon. The plan is to eventually inject 130 million gallons a day of treated water deep underground, to begin replenishing the wedge of waterlogged sand tapped by wells that serve hundreds of thousands of people and businesses.

They're currently drawing about 100 million gallons a day from those wells, with the result that groundwater levels in parts of eastern Virginia have dropped 200 feet over the past century.

At the York River plant, HRSD engineers crossed a first hurdle: seeing if they really could clean Hampton Roads wastewater to the point where it is safe to drink. They got official word that they had done so just this week.



Water and wastewater agencies elsewhere have already done so. About 1.3 million people in Northern Virginia drink from a reservoir that the Upper Occoquan Service Authority tops up with treated wastewater. People in Orange County, Calif., and El Paso, Texas, drink treated wastewater as well.

"It was absolutely delicious," said Molly Joseph Ward, Virginia's secretary of natural resources, after trying the treated water.

She thinks the HRSD project could address critical environmental and economic challenges beyond halting the steady draining of a major source of water. It could also stop saltwater from seeping into the aquifer.

Pumping the specially treated water into the ground, instead of the current practice of discharging wastewater into the Hampton Roads rivers that flow into the Chesapeake, could help the state reach the tough new pollution standards set by the [U.S. Environmental Protection Agency](#), Ward said.

It would also help HRSD and the cities and counties that belong to it reach the EPA's tight standards for runoff after storms, by slashing virtually all the nitrogen and phosphorus — two key pollutants — that HRSD now discharges, she added.

"These are really some game-changing concepts," said Ann Jennings, Virginia director at the Chesapeake Bay Commission.

The next step, Henifin said, is a bigger pilot plant in Suffolk.

The district will ramp up one of the two treatment options it tested at the York River plant to see if it can produce 1 million gallons a day and inject it into the aquifer. The injection well will be circled by monitoring wells to track how water moves once it is underground.

Computer models suggest the pace will be about 2 miles in 50 years. For those who worry about drinking something that was once wastewater, but that was treated to drinking water standards, Henifin notes that the HRSD plants where he expects to be injecting the used water are generally surrounded by homes and businesses that receive water from Newport News Waterworks and its counterparts in South Hampton Roads.

HRSD will do that 1 million gallon a day test at its Nansemond Treatment plant in Suffolk, beginning in 2018, after it finishes a \$15 million investment in the pilot plant, Henifin said.

After about a year of running the pilot plant, he hopes to have enough experience — and enough proof that the system works — to apply for state permits to go ahead with systems at seven plants.

Henifin hopes to have the first running in 2022 and to bring the seventh online in 2030.

That's where the big bucks — the bulk of the \$1 billion effort — come in.

Henifin says HRSD can fit it into its \$4 billion-plus, long-term investment plan. That means no rate increases beyond what are already planned, he said.

One key could be how the EPA feels. The plan would work more easily if the federal agency would let HRSD slow its pace a bit on building facilities to reduce the amount of sewer overflows that hit the bay when heavy rainfall backs up the system, Henifin said.

Freeing up some of the money committed to that effort into the 2020s for use in the groundwater replenishment effort could yield far larger reductions in pollutants by cutting HRSD's routine discharges to almost nothing. Spreading out work to contain storm-related overflows over more years would make that costly effort easier to manage.

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The treatment

The Hampton Roads Sanitation District treats wastewater so that it is safe to discharge into the region's rivers and the Chesapeake Bay. That means removing trash, sediment, organic waste from people, animals and plants, and nitrogen and phosphorus. In practice, HRSD's discharges run at about 25 percent of what state regulators allow. To get that water to drinking water standard, HRSD plans to:

- Pump in two chemicals to make any remaining particles clump together, then...
- Run that water through a tank where propeller-shaped fans drive the clumps down, so that they settle into a basin, before....
- Bubbling ozone through the clump-free water, setting off reactions that break down any organic compounds into simple sugars and acids that...
- Are digested by bacteria trapped in filters made of carbon granules (in the York River plant those filters were more than 10 feet tall). From there, the water ...
- Flows through equally large stacks of carbon granules to absorb any remaining chemicals, and the water ...
- Is zapped with ultraviolet light to remove any bacteria or viruses that may have made it that far.

The process is similar to the way water companies treat drinking water.

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